Physics 202

Special Relativity
Introduction to Quantum Physics

Spring 2013

Physics 202 is an introductory course in special relativity and quantum mechanics. It is a required course for physics majors but is also appropriate for students who just want an introduction to this material. Physics 201 is a prerequisite for this course, and you should have taken or be taking concurrently differential equations and vector calculus. The textbook is **Quantum Physics** by John Townsend. For the special relativity section, the appendix of Townsend plus notes I will post on Owlspace will probably be sufficient. However, I also recommend a classic text **Special Relativity** by A. P. French.

Homework will be assigned weekly and will be a substantial part of your grade. Some of the homework problems will be pledged, which means you are not allowed to work together or discuss those problems with anyone else. However, you are permitted to use the text books and your notes to work the pledged problems. The two lowest pledged problem grades will be dropped. The rest of the homework will be unpledged, which means you are free to work together and discuss these problems freely with other students, and you are free to come and ask me for help and hints.

In writing out your solutions, both on the homework and exams, it is important to present your work clearly and logically. The answer alone, even if it is correct, is not sufficient. You need to demonstrate how you arrived at your answer.

The grades will be assessed as follows:

Homework-unpledged 25%
Homework-pledged 25%
Midterm 25%
Final 25%

Both exams will be take-home. You will be able to take the midterm any time during a one-week period (to be determined later). The final exam will be due on the last day of the final exam period.

I am Professor Corcoran, my office is in Herman Brown, 230C (x6078). Feel free to stop by anytime to see me. The best way to get in touch with me is through E-mail, corcoran@rice.edu.

Outline of the course:

I. Special Relativity

II. Light
The wave nature of light
The particle nature of light
Probability amplitudes and interference

III. Wave Mechanics
The Schroedinger equation and wave functions
The uncertainty principle and wave packets
Expectation values.

IV. The Time independent Schroedinger Equation
Separation of variables
Particle in a 1-d box
Superposition

V. One-dimensional potentials
Particle in a box
Simple harmonic oscillator
Step potentials, scattering, and tunneling

VI. Operators and observables
The parity operator
Commuting and non-commuting operators
Time development of wave functions

VII. Three-dimensional potentials
Particle in a 3-d box
Orbital angular momentum
The hydrogen atom
Intrinsic spin

VIII. Multiparticle systems

IX. Special topics
- Condensed matter
- Nuclear physics
- Particle physics